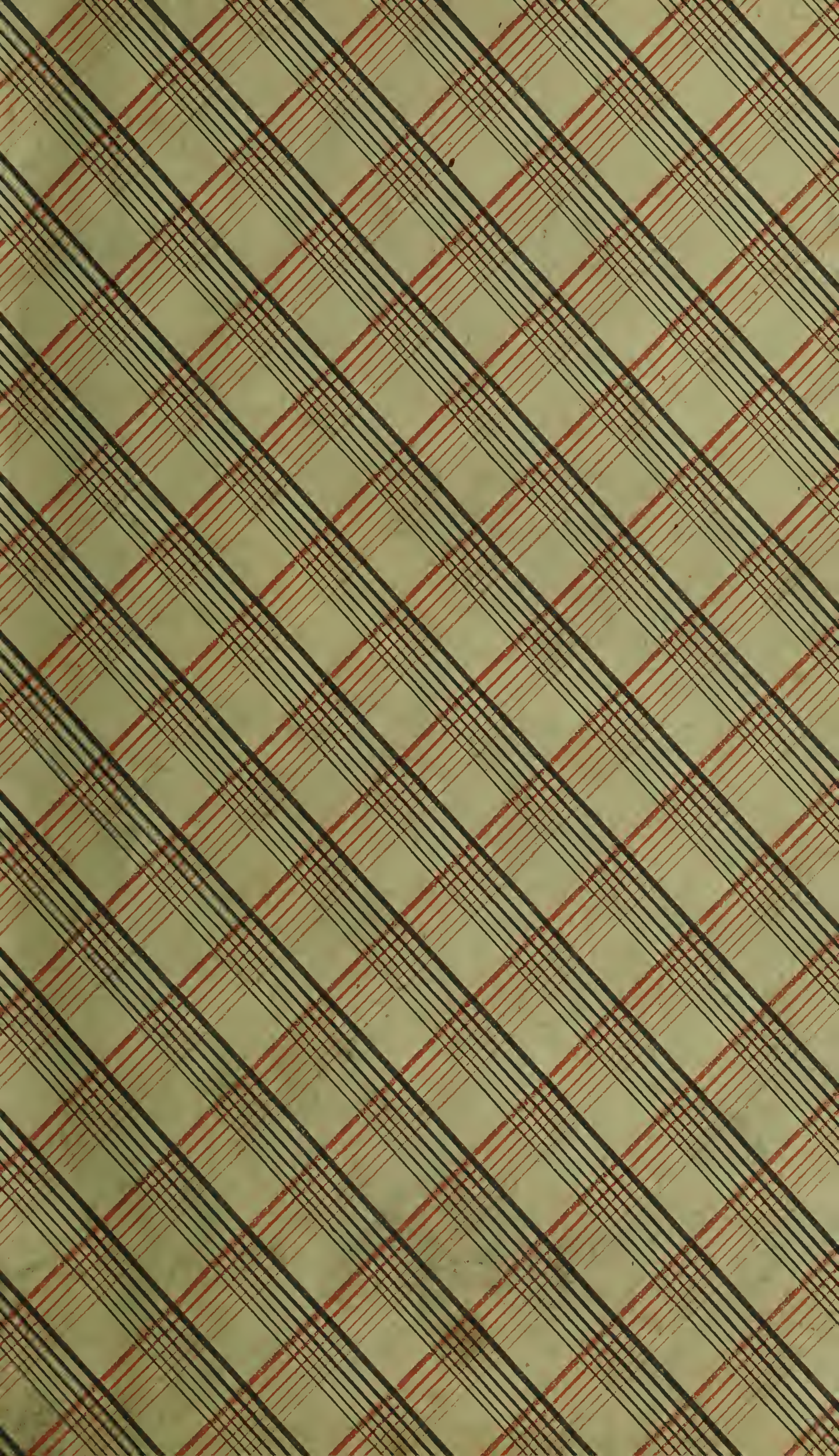

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TO THE

FELLOWS OF THE ROYAL SOCIETY,

LONDON.

THE

FABRIC OF THE WORLD EXAMINED.

BY THOMAS JOB.

CARMARTHEN:
PRINTED BY JOHN THOMAS, PRIORY STREET.

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PREFACE.

In offering this small Treatise to the notice of the Royal Society, for the revision of its subject matters, it is needless to frame any excuse for its appearing under this inconsiderable form, though the want of proper instruments for making celestial observations, and the absence of plates, make considerable deduction from its perfection.

I laboured under the greatest disadvantages, having no instruments to take celestial observations when necessary, but what I managed to frame myself, neither received I any instruction in Mechanics, Astronomy, or any other science in Natural Philosophy, but what borrowed books could procure; nor had I time to peruse them, but during the hours that ought to have been devoted to rest, after my hard and toilsome work during the day was over.

The reader will perceive that the following small Treatise is a production of the dint of genius, and most of what it contains never before appeared in public.

The power of repulsion, maintained on the idea of the force of the sun's rays, in the demonstrations of the two great laws of Kepler, the manner in which the sun's rays traverse through all space, with the theory of Jupiter's belts and Saturn's ring, are entirely my own invention. I also refute great Newton's theory of elliptical orbits, and frame another of my own, which I deem is more agreeable to reason and truth. There is also an attempt to reduce the diurnal rotation of the planets on their axis, as well as their revolutions in their orbits, to a certain proportion of their mean distances from the sun; but if this will stand the test of reason, and if time and opportunity will permit, this work will again appear on another scale, all things demonstrated in full, with many emanations added for the benefit of the learned, is the earnest prayer of

Your most obedient Servant,

THE AUTHOR.

Frogmore, near Carmarthen, August, 1847.

THE FABRIC OF THE WORLD EXAMINED.

On viewing this goodly fabric, the World, and attentively examining its inimitable structure, the inquisitive mind can hardly abstain from presumptiously enquiring how this wonderful architecture was performed, and is preserved together in such an ordered and harmonious a system, notwithstanding its having passed through so many centuries of revolutions.

In the first place, I shall endeavour to arrange and examine analytically the several natural properties which, by actual experience, are discovered in the execution of this noble fabric, together with the natural laws by which they seem to be regulated.

In the second place, I shall endeavour synthetically to collect the natural processes by which this regular system might have risen from chaos, in consequence of those virtues, and agreeable to those natural laws, and eventually came to the form and order in which it now stands and appears to our examination.

The first and chief virtue to which we shall turn our attention is that which is well known to exist in all bodies, and is generally called, the power of universal gravitation. By this power all the heavenly bodies attract each other, and tend mutually to approach together, and unless expelled by another opposite force, they would ultimately dash together into one common heap of formless mass. This property is well known to exist in our terrestrial globe; for if a stone, or any heavy body, be left to fall from a high place, it will descend to the ground in a straight direction from the place, towards the centre of the earth, or in a straight line which is perpendicular to a tangent to the earth at that point from which the stone or body was perpendicularly risen up; and if the experiment be tried near a large mountain, the attraction of the mountain itself will be found to alter materially the direction of the falling body from its perpendicular, and to deflect towards the centre of the mountain; hence it is fairly inferred that all bodies, and every particle of matter, attract and are attracted, whether in composition or abstractedly by themselves; hence the power of attraction in all bodies is in proportion to the quantity of matter in each; and as a further proof of these facts, it has been found by experiments that in a space void of resistance, all bodies, whether large or small, light or heavy, will by this force fall to the ground precisely in the same time, for in a receiver exhausted of air, a feather and a sovereign will descend together.

We shall further premise that the power of attraction, like that of light or heat, or any other virtue that emanate from a centre, is subject to such a law that it always increases in power as the square of the distance from the centre decreases from any distance to the surface of the attracting globe. We may measure the force of the gravity of the earthly globe by the velocity a body left to fall, from a quiescent state, would acquire in the first second of time; therefore the square of that will be the velocity which it will acquire in descending for another second of time, and so on. A body so circumstanced, in the latitude of London, has been found, by repeated experiments, to have acquired, in one second of time, a velocity of 32 1-6 feet. Again, we may premise that as the power of gravity decreases at all distances from the surface of the attracting globe outward, as the square of the distance from the centre increases, so also it decreases at all distances within the surface of the same body, from it to the centre, in proportion to its distance from the same centre, where all motion would vanish, and all bodies would remain at rest, which will appear evident to the reader from the following demonstration.

It has been before premised that every particle of matter of which the earth, &c., is composed attracts in like manner. Then, a heavy body being placed near the surface of the earth will be attracted by every particle of matter in the whole globe in nearly the same direction. Now, supposing the heavy body to fall, by its weight, into a hole bored through the centre of the earth, it is evident that those particles by which it passed in its descent must have attracted it in a direction contrary to what they did before; therefore its motion must have been retarded at every degree of its descent from the surface to the centre, where all its motion must have ceased, and the body remain stationary; for there the attraction from every part of the globe must always be in *equilibrio*. Hence it is evident that the aforesaid heavy body must have descended in a straight line from the surface to the centre; for the earth being a globe, the attraction on every side of the said hole must be in *equilibrio*, at all distances from the surface to the centre.

It is also evident that if the heavy body was to be removed to any distance above the surface of the earth, and set at liberty to fall, it must always fall in the same straight direction towards the centre; for on that line the attraction of every particle of matter, from all sides, must always be in *equilibrio*.

Now, after having presented to view the Power of Attraction, with its properties and laws, I shall endeavour to demonstrate the existence of another Power, not less powerful, with its properties, and the laws by which it is regulated, which I shall call the Power of Repulsion, and define to be such as would repel the planets, &c., always further from the centre of motion, and unless conspired against and be overcome by the Power of Attraction, it would have driven all the bodies in the Solar System in every direction of space, until they would have finally been lost in the great expanse of infinite vacuum.

Such a force as I have defined certainly exists in the rays of the Sun's light, for since the rays of the Sun's light are considered to be particles of material substances, and to be projected forward with such great velocity, as to pass through 95,000,000 of miles in 8 minutes; and as there is an infinite number of these particles falling upon every visible particle on the enlightened surface of the whole earth, in every instant of time, let them be as small as ever they may, what rational man would deny that their joint force against the enlightened surface of the earth would not be sufficient to disturb the planet, supposing it to be at rest, and not acted upon by any other force whatever at the same time; for that force must have been exactly the same as if all the particles of light falling on the whole surface of the earth at the same time were collected into one huge ball, and shot perpendicularly, with the rapidity before mentioned, against that part of the earth where the sun is vertical at any time.

One instance or two will be sufficient to establish this principle on an untottered foundation.

The first instance which I shall present for this purpose shall be from the strange Phenomena of the Comets. It is well known to Astronomers that these bodies, when in their Perihelion, or in the neighbourhood of the Sun, are so much heated by its rays as to be melted into a complete ocean of fire. The only assigned reason for this is, that those material rays of light proceed from the sun with great velocity, striking vehemently against those bodies with such a force as to stir up the fire naturally contained in them until it overcomes the neighbouring elements, and utterly swallows them up in its consuming fury.

The immortal Kepler, when assinging the reason of a Comet's tail, observed that those rays of light, in their progress from the Sun, strike against the bodies of the Comets until they melt them into lakes of fire. He justly maintains that those rays might pass through a body so melted the same as through glass, air, water, or any other medium; and therefore, on account of the proximity of that liquid and luminous body to the body of the Sun, that those particles, or rays, might pass through in such a tremendous thickness and with so great a velocity as to force out of it, in their passage, great streams of burning particles, and scatter them abroad during their courses through the infinity of space. Now it is evident that the force of the Sun's rays upon a planet so circumstanced would require an enormous power of attraction to sustain that body in its orbit, and to preserve its regular economy, lest it may be wafted away by the power of Repulsion, and finally become a prey to utter darkness.

It appears probable that there might be some means by which the force of the Solar rays, when striking against terrestrial objects, might be measured. The method which I attempted was to take a blacksmith's anvil of about a foot in length, and about six inches in breadth, and expose it to the Sun's rays on the hottest noon-day in our climate, which is greatly too far northward to be a mean climate in our hemisphere; I next observed the time it required to grow as hot by the action of the Sun's rays so that I could scarcely lay my hand upon it; again, I placed the anvil in its former position, and allowed it to cool into its previous temperature, I then took a hammer, and observed at what rate I should have to strike with it upon the anvil in order to obtain the same degree of heat, in the same space of time, as when exposed to the Solar rays; but the force of my strokes acted only at intervals, whilst the Solar rays acted unremittingly. I further observed that if 18 or 20 men were to strike together on the same anvil, so as to produce a perpetual number of blows, and that one of their blows was nearly equal to the effect of the Sun's rays on every square yard of the earth's surface in our climate, in one instant of time, and as the whole enlightened part of the earth's surface contains about 308,124,080,000,000 square yards, what a tremendous shock must our globe have sustained when struck with equal force, and at the same instant, by upwards of three hundred and eight millions of millions of men of ordinary strength! I should think it to be a sufficient task for the power of the Sun's attraction to preserve this huge globe from flying off with the greatest rapidity to the utmost limits of the universe.

Thus, on observing with what vehemence the sun's rays strike against the earth and other planets, it occurred to me that if the earth, &c. be placed in a void space, that those particles of matter with their rapid progressive motion must have striken the planets with such a force so as to disturb them in their several mansions, perhaps, so as to cause their centrifugal force, and be the cause, together with the power of gravity or attraction, to preserve the planets in their several orbits round the sun, and also to cause their diurnal rotation on their axis; it also appeared more reasonable, when I considered the planets to move in their orbits and on their axis the same way as the sun turns on its own axis, viz., from west to east, and that it is a law in nature that such particles thrown from a body in motion must partake of the same motion, as if a stone or any heavy body be let fall from the top of a mast of a ship when sailing, will partake of the motion of the ship, consequently, such particles of light proceeding from the sun, or its atmosphere, when turning on its axis, they must strike against the earth, &c. sideways in such an oblique manner as to cause it to move the same way.

Now, on observing that the quantity of light and heat, or in other words, the force and thickness of the rays of light proceeding from the sun decreases always as the square of the distance increases, which is the same ratio as the centripetal force or the force of attraction; now, by supposing any such force to be the centrifugal force of the planets, it is plain that the centrifugal and centripetal forces of the heavenly bodies in our solar system, must decrease at all distances exactly in the same ratio. Hence, it follows, that the mean velocities of the planets, as caused by the joint action of those forces must decrease in the same ratio, viz., as the squares of their distances from the centre increase. Again, the immortal Kepler observed, that the radius vector of each planet describes equal areas in equal times on the plane of its orbit; then supposing the orbits of all the planets to be circles whose radii are their mean distances from the sun, then equal spaces on the circumferences of those circles, as well as equal parts of their areas will be described in equal times. Now, the velocity with which each planet describes that circumference will be its mean velocity in it its elliptical orbit, it is uniform and equal in every part of the said circle. Hence, it is evident, that the velocities with which any two planets describe equal parts on the circumferences of their own circles, will be in exact proportion to the areas described by their radii, for the times and velocities are always in proportion to each other; but the areas of all circles are to each other as the squares of their radii. Hence, the velocities, and the times by which any two planets describe equal parts of their orbits are as the squares of their mean distances from the sun.

But Kepler observed, that the squares of the times which the planets take to perform their periodical revolutions round the sun, are as the cubes of their mean distances from the sun. But we may further observe, that these times must also increase as the length of those orbits increase, and the circumferences of all circles are to each other as their radii. Now, we have two reasons why the periodical revolutions of the planets bear relation to their mean distances from the sun; the former is as the squares of their mean distances, and the latter is as the mean distances themselves; and in order to compound those causes together, multiply the time by the time, and it will give the square of the time, and the square of the distance by the distance, and you will have the cube of the distance. Hence the squares of the periodical times of the planets are as the cubes of their mean distances from the sun, which I deem to be a fair demonstration of Kepler's great law of motion, agreeable to the new principles which I have stated before.

Now, as the centrifugal and centripetal forces of the planets both increase and decrease together, and also act perpendicular to each other, the result from both these forces would be, that each of the planets must have described a perfect circle for its orbit. But as the planets move not in circles but in elliptical orbits, there must be some other force different from both these to cause them to decline at all from circles to describe ellipses, to the discussion of which I shall next proceed.

The great Sir Isaac Newton seems to maintain that the centripetal or attractive force of any planet is much greater than the repulsive, even in the most distant part of its orbit; and he supposes this to be the reason why a planet declines at all from the circumference of a circle to describe an ellipsis, and as that attractive force, which is the strongest, draws the planet nearer and nearer to the sun, that it adds strength also to the repulsive all the way from the aphelion to the perihelion, till at length the projectile force comes up with, and even overpowers the attractive force, and that to be the reason that the planet is not absorbed into the sun's rays, but tended to force out to another and opposite aphelion.

But with what authority soever this hypothesis was given, or with whatever zeal it may be hereafter maintained, it is however ill-founded and inexplicable; for how can a force add strength in its own direction to another which is perpendicular to it in a greater proportion than to itself; for one of those forces by overcoming the other will not destroy its perpendicularity, for the repulsive force always endeavours to cause the body to recede in the tangent of the circle whose radius is the radius vector at that point.

But notwithstanding all those things, we may further ask, if the projectile force of a planet were in itself permanent, and the attractive force conspire in some degree with it, in such a manner as to accelerate its velocity all the way from its aphelion to its perihelion, and having its motion thus accelerated at that point, so as to acquire so much tendency to fly forward towards another and opposite aphelion as to overcome the sun's attraction; the question is what hinders such a planet to fly off towards this opposite aphelion? The answer must necessarily be, the sun's attraction; but it is evident the sun's attraction can never do this unless it will come up with, and balance this accelerated projectile force; but if the sun's attraction balance and overcome that force so as to tend to bring the planet back again towards the sun's body, and being now of course greater than the projectile force, I further ask how can that diminished projectile force urge the planet back again to its former aphelion, seeing it receives no additional force again from the attractive power, but on the contrary, the sun's attraction now acts against the planet's projectile motion, as Newton justly observes: it is evident then, I should think, that the planet could never attain at that point, but must be totally overcome by the sun's attraction, and swallowed up in the disc of that glorious luminary.

Now, considering all these things and being wholly convinced of the absurdity of the "Newtonian theory," it falls on me a question to give an account why a planet at all declines from the circumference of a perfect circle to describe an ellipsis, for it must be occasioned by some force different from both these, but what this force might be, the certainty of its existence impelled me to the most rigid researches.

After several unfruitful attempts, being at last wearied with the labour, one morning on observing a boy whipping a top on the flags, I perceived the top to have a motion, as it was beaten on its axis, to advance forward in the same direction, and by that motion to endeavour to fall over the flags, until the boy had turned his hand and given it a lash in another direction, then it endeavoured to seek the wall again with the same eagerness. On observing this, I thought immediately of my problem, and soon discovered the whole secret; for the planets being so beaten by the sun's rays, and so made to turn on their axes the same way as they turned in their orbits round the sun, they must approach nearer and nearer to the sun's body at every dash of the sun's rays all the way from their aphelion to their perihelion, and consequently to move in lines less curved than the circumferences of circles.

On the contrary, from the perihelion back again to the aphelion, the planets must endeavour to depart, at every lash of the rays, further and further from the centre of motion; for in this part of their orbits they turn on their axes in different ways with respect to the sun, and therefore, instead of describing small circles round the sun as they would do otherwise, they must have been driven constantly further from its centre till they arrive at their aphelion again, and so on continually.

Now, from these considerations it appears, that as the centrifugal and centripetal forces of the planets act perpendicularly to each other, if every other force were to be taken away, the planets must have described perfect circles for their orbits, but as the rotations on the axis cause the bodies to draw aside from that direction towards the centre, at all distances from the aphelion to the perihelion, and on the contrary, in the opposite part of their orbits; hence, it is easy to perceive not only that the planets have the sun in one of their focii, but they must have it there, and also to revolve in elliptical orbits.

It may be objected by some, if both the repulsive and the attractive forces increase and decrease together, why bodies near the surface of the earth when set at liberty to fall do not encircle the earth in the same manner as the moon does? This question may very easily be resolved, for as the power of attraction exists in the body of the earth, and therefore attracts the heavy bodies towards its centre, but the repulsive force does not proceed from the body, but from the surrounding atmosphere, as is hereafter discussed, and consequently bodies near the earth's surface cannot be materially affected thereby.

On a further contemplation of the heavenly bodies and their motions, it appears reasonable to me that there might be some relation between the planets' rotation on their axes, as well as their revolutions in their orbits, so that if the diurnal space of one of them be ascertained, those of the rest of them might be found by proportion; and as the same cause seems to be the reason of both these motions, viz., the force of the solar rays, as they traverse out of the sun's disc or atmosphere, it might be suspected that they are liable to the same law, that is, that their motion on their axes decrease, or which is the same thing, the length of their days increase as the squares of their mean distances from the sun increase. Upon this hypothesis it appears, that if the earth be twenty-four hours in turning once on its own axis, Mercury must have been only 3 hours 3 minutes 4 seconds in describing one day, and Venus's day would be only 12 hours 35 minutes 4 seconds long, also that of Mars would be 55 hours 55 minutes, of Jupiter, 650 hours 16 minutes, of Saturn, 2188 hours 8 minutes nearly, of Herschel, 8827 hours 58 minutes.

On observing the vast differences that are between these results, and the times of their diurnal rotations, which are found by observations, I thought of banishing my hypothesis as incongruent with reason and inconsistent with truth; but it is further evident by a certain well known reason that the motion of the same planet on its axis is much swifter when in its aphelion than in its perihelion, and consequently, the earth turns on its own axis several times more when on the north side of the equinoctial than when on the south side of it. Now, if the aphelion of the earth's orbit were to be extended so far outward as the orbit of Jupiter, the day when there must be greatly shortened; on the other hand, if its perihelion were to be contracted to the orbit of Mercury, the day when there must have been greatly prolonged. And as this increasing of the planets' motion on their axes is occasioned by the slowness of their motion in their orbits, it must be inversely as their several distances from the sun, but it has been proved above that by the action of the sun's rays their motion on their axes must increase in the direct ratio of their several distances from that centre of motion; therefore, by both of these reasons, the time of the diurnal rotation of each of the planets must be exactly the same, notwithstanding their several quantities of matter for bulk and weight is here entirely out of the case, as I shall soon demonstrate; the result here agrees very nearly with the truth, as is stated by the observations on both the inferior planets together with the earth and Mars, but Jupiter and Saturn do not take half the time of the others in turning once on their own axes; consequently, there must be some other power and laws that must be taken again into consideration, to which I shall next call the reader's attention.

I shall here observe, that the diurnal motions of the planets must also be affected, viz., accelerated or retarded according to the obliquity of their axes to the planes of their orbits, for as any planet's axis is always directed nearly to the same fixed point in the heavens, and hangs as if it were tied towards that point; now it is evident that if the planet's axis were perpendicular to the plane of its orbit, it would expose its equatorial parts to the sun, parallel to the centre of force, and consequently that force would act upon it more direct and strong, and the force by which the planet is directed to that fixed point in the heavens will not at all act against the force of those rays of light; hence the planet must have turned more freely and quickly on its axis. Then as Jupiter and Saturn's axes are considered to be nearly perpendicular to the planes of their orbits, so they are moving swifter on their axes than the other planets whose axes are greatly inclined therefrom.

All that I wish to infer in this place is, that if all other causes were to be taken away, the length of the day in each of the planets would increase as the square of their distance from the sun increases, and that the obliquity of their axes to the plane of their orbits, with their different motions in their elliptical orbits, are the causes of all the deflections from this general rule.

We may also infer that if all the planets were to be placed where Mercury, or any other planet now is, they would immediately assume that of Mercury's motion, both diurnal and periodical, if circumstanced in the same manner, and they would follow each other regularly in the same orbit, and their momentii, as the quantity of matter in each.

But yet there are some who may question, why does the moon, which revolves round the earth and follows thesame law, as to gravity, with the primary, round the sun, and whose axis is nearly perpendicular to the plane of her orbit, as that of Jupiter or Saturn, which revolve on their axes in nine or ten hours,—why does the moon also, as well as these, revolve on her axis in about the same time, instead of taking about twenty-eight days in performing one rotation, and completing one of her days?

This difficulty again may easily be removed, for the earth is of the same distance from the moon as the moon is from the earth, but the earth contains forty-nine times as much matter as the moon, and consequently the attraction of the earth on the moon is about forty-nine times greater than that of the moon on the earth. Therefore, if there is or ever was any part of the moon's surface in a state of fluidity, such as can be moved by so great a power of attraction, the height of the tide in the moon therefore is so many times higher than that on the earth, as to cause the moon to be of a spiral form or figure, the major axis of which points exactly to the earth's centre, and is perpendicular to the axis about which the moon revolves. Now, the power of the rays of light traversed from the earth, by which the moon is wafted around it in her orbit, could not cause the moon to turn on its axis with similar rapidity, on account of the great tendency of that prominence towards the earth's centre, so that the moon could not revolve on her axis unless the tide would move from the same place on her surface; but the tide could never move from the same place unless the moon could shift to turn that axis or diameter from a straight line with the earth's centre. Now, as the moon revolves in her orbit round the earth once in a month, and by keeping the same axis to point towards the same place in the heavens, it has in this manner a tendency to show every place of her surface to the earth in that time; now, as soon as a new region on the moon endeavours to become visible to the earth, the tide will immediately tend to move towards that place, but as soon as the tide moves on the moon's surface the moon itself will be at liberty to revolve on its axis, according to the principle laid down in this work. But yet I must remark that this tide or prominence on the moon's surface does not need to be a fluid at present, nor to move, only that I, in this demonstration, must consider it to be moveable, so that when one revolution is performed roud the earth, one rotation is also completed on the axis, so that the same side of the moon is always turned towards the earth agreeable to the observation made by all wise philosophers, together with the new principles demonstrated in this work.

I shall further only observe, how far all other philosophers had wandered from the way, by stating that size the fire of a planet, the rate of its speed, and its distance from the sun are circumstances exactly suiting each other, and were the least change to be made in one of them, the rest would need be changed to preserve the economy of the planet, &c. (see Chambers's Introduction to the Sciences, page 25, 1833,) not observing that simple and long established principle, that the power of gravity is of such a nature, that in a space void of resistance, all bodies, whether light or heavy, large or small, will fall to the ground in the same time.

PART II.

Where I shall synthetically examine the natural processes by which this regular system arose from Chaos, by the action of those properties, and in consequence of those laws, of which mention is made in the former part.

By Chaos we mean the matter or element of which the universe and all things were made, in its confused state, without form, and void of any regular order, but promiscuously scattered throughout all space, comprising the darkness of the deep and the waters of the vast Hyatus.

Now, supposing the matter of which the whole universe were made, to be scattered throughout the vast expanse in a kind of gas. It appears by what has been demonstrated in our former part, that some of those particles would begin to come together by the power of attraction existing in them, and crystallized to different substances, &c.; others at a greater distance, by following the same law, begin to approach and strike against those former ones with greater force and velocity, till all the neighbouring particles would run together into one common heap, forming a huge body amongst all others, which body we imagine to be the centre of a system, as our sun. Other particles again, at a very great distance, being disturbed by the attraction of this body, and as they move towards it from all parts, some of them, by the same power, would meet together far before they would reach this primitive body, and form large masses at several distances from the former, and consequently, falling into this primary mass in large heaps, causing it to appear rugged and mountainous.

Some also of those particles that formed those secondary bodies, would, by following the same law, come together far before they would meet them, and therefore, falling in huge masses upon them, as I have said of the primary, and so on without end. Hence, it is not difficult to perceive how those primary, as well as secondary worlds would appear mountainous, and those mountains hilly, and those hills again uneven.

Now, those particles of which those different worlds are composed, became themselves different in their density, bulk, and form; and as they form those bodies with the greatest slowness, those different particles take their proper places amongst each other; those which gravitate the most take the lowermost place in the system, and those less gravitated particles, swim upon the surface of those others, even as cream upon milk, or as chaff comes to the surface of the sieve. Consequently, those particles of which water and air are formed, take their proper places one above the other, above the more gross particles of earth, &c. I mean that quantity of them which remain over and above after filling the pores of those lowermost masses, as all fluids always seek the lowermost place while there is room, and what remains stands above the rest; for those lighter and higher particles are smaller and more penetrating, and consequently stand amongst the particles of the lower masses till their pores are full; so water sinks into the pores of earth, and air amongst those of water, &c.

There is again another fluid consisting in all bodies of finer particles, more penetrating, and rises infinitely higher than all others, which I have also mentioned, which all philosophers call "The Electric Fluid." This fine fluid exists in great abundance even amongst the particles of the air, and consequently in water and earth, &c. The electric fluid is of such a nature as it might be excited and brought out of anybody by rubbing it with proper substances, and it will escape out of it in flashes of light, if it be forced to action in a dark room. The electric fluid which exists amongst the particles of air is, by certain processes excited and often driven out from amongst them in large streams, making dreadful appearances, as we often see in the aurora borealis, lightning, and other strange phenomena of the atmosphere. These phenomena appear oftner in clear or frosty weather, when the air is contracted closer to the earth, and consequently more thick and heavy. We know that the air is thicker at the Poles than at the Equator; hence is the aurora more frequently seen in the Polar than in the Equatorial region. Hence I imagine that if our atmosphere were several times heavier than it is at present, that it might produce continual aurora, not only in the Polar regions but throughout the whole atmosphere, affording sufficient light to enlighten the whole earth.

Now, it seems no absurdity to state, that the atmosphere of that primitive mass which we call our sun, exceeds those of the other secondary bodies in height, so much as its body exceeds them in bulk; for as those approaching bodies with their surrounding atmospheres strike against that original great bulk, it is evident that the atmosphere which are about those parts where the bodies cohere would rise up into the atmosphere above them, and so on continually, till the atmosphere of that body is much higher than that of any approaching body, and as it is higher it is of course thicker in the lower regions, and consequently more heavy. After reflecting on these things, I am ready to infer that the atmospheric fluid of the sun is sufficiently thick so as by its movements or ebbing, &c. to excite the electric matter amongst its particles so as to break out into refulgent flames, not only in the Polar regions, but also in every part of its atmosphere, affording abundant light and heat to the Solarians, without the least intermission or change of season. Now, as we before observed, it is a general law in nature that a lighter fluid always tends to rise in and float on a heavier fluid, ard will meet with no resistance in its passage through its particles, as vapour will ascend in air, it will also ascend in water and air without any resistance, and will seek the higher regions of the atmosphere ; so also the electric fluid will ascend above any of those, and will fill the whole solar system with its atmospheric circuit ; in like manner are the particles of light lighter than those of electricity, and will ascend in it with such rapidity as to pass through ninety-five millions of miles in eight minutes of time, seeking the higher regions of the electric fluid of the sun, far beyond the limits of the solar system, striking against worlds and their atmospheres, tending to waft them off to the utmost limits of space. Some other fluids again might exist in nature lighter and finer than any of those, and can easily ascend from the uttermost fixed star unto this earth by floating on those others. But as to these I shall at present say no more; but that all space is full of material substances, and that *there is no vacuum in all nature.*

Now, as soon as the sun was enlightened, as above described, and the particles of light dispersed abroad, the planetary bodies which before were falling to the sun in great numbers could approach no further, bu the Law of Repulsion began to act upon them in the manner which I have described in the first part, and tended to force them backwards in different direction till they were compelled to move in their respective orbits by the joint action of the repulsive and attractive forces, by the general laws of motion which I have been describing.

Then it is reasonable that those luminous clouds in which the electric fire appears, does not always fill the whole atmosphere of the sun, but that there might be intermission and clear air in some spaces, at which places the body of the sun itself appears unto us on earth in large dark spots, affording a phenomena, which puzzled the curiosities of the Astronomers of the latter ages.

Now, as these spots appear to move across the sun's disc towards its western limits, and there to disappear, and again to reappear in the same form on the eastern edge, Astronomers justly inferred the sun himself to have a motion on its own axis from west to east, and to perform its rotation in about twenty-five of our days.

Now, as the body of the sun turns on its own axis, so also must the atmosphere which encompass it turn about with it in the same time, and on the same axis, extended to the heavens, which assertion is not founded on a base hypothesis; for we know the atmosphere of our earth to have the same motion with the earth on its axis. We often say that the air is corrupted in a certain place, and that contagions or fevers remain there; besides, we see rain and storms remain for days in some places and not in others, and also we see clouds to stay one whole day within our view, which could not take place otherwise. Hence, we deem it no absurdity to infer that the particles of light which arise from the sun's atmosphere while it is in motion will also partake of the same motion, by a certain law which we have before demonstrated, and consequently to fall upon the earth and other planets with their atmospheres in such an oblique manner as to cause them to move the same way, both on their axes and in their orbits. Hence it is well known that these particles of light are not only swift in motion, but also are very elastic and will reflect from any hard or elastic substance on which they impinge, with the same power and speed with which they inside upon it.

Again, the moon could not be repelled by the force of the sun's rays, for the moon does not depend upon the sun, but on the earth, towards which it approached by the power of attraction before the system was enlightened by the solar rays; therefore the action of the sun's rays could not compel the moon to revolve about him, neither to turn on its axis by impinging upon it, but the power of the earth's reflected rays can only act on the moon to such an effect, though that of the sun's rays, with its attraction, may cause some irregularities in her course round the earth, as is explained by the venerable and immortal Newton. Now, as the rays of light, by which the moon is put in motion first fall upon the earth and its atmosphere before they impinge upon the moon; and as the earth is at the same time in motion, it is evident by the law which I have been demonstrating, that those particles as they reflect from the earth, must partake of the same motion in their progress towards the moon, and therefore to impinge on its surface in the same oblique manner, so as to cause it to move in the same direction as the earth itself, viz., from west to east.

Mercury, Venus, and Mars, have no moons known to us at present, though it is contended that Venus has one,—it might well have one or more; the rest also might have several moons according to the circumstances in which they stood when the system was enlightened; there might as well be moons attending on those moons as their primaries, and so on according to my principles in this work.

Four other planets were lately discovered between the orbits of Mars and Jupiter, named Vesta, Juno, Pallas, and Ceres. I shall not wonder if four others again will be discovered, and many more through all parts of the system, of every imaginable balk, or at any distance from the sun, and also to revolve on their axes with all different speed, notwithstanding what other Philosophers have maintained on the contrary, as I have before hinted.

Next after these comes the great orb of Jupiter, with its four attendants in regular order. This is by far the greatest of all the planetary orbs in our system; it is nearly a thousand times as large as our earth, and yet turns on its axis in less than half the time the earth takes.

The atmosphere of this huge planet extends to a vast distance above its surface, and consequently the clouds which are in the highest regions of its atmosphere, and which are turning round on the axis of Jupiter, extended to the skies, in the same time as the body of the planet; the velocity of such clouds must exceed the velocity of Jupiter on its axis, or that of any spot on its surface in proportion to the squares of their distances from the centre of Jupiter. These clouds, for their great velocity, cannot appear distinct on the surface of the planet, but as a thunderbolt descending from the cloud, so they appear in so many distinct continued stratas on the surface of the planet, forming those phenomena which are called "Jupiter's Belts;" and as Jupiter's axis is perpendicular to the plane of its orbit, and that nearly parallel to the ecliptic, so those belts appear parallel to its equator. In the next place comes the leaden orb of the planet of Saturn, with its seven moons as attendants upon it. This planet is accompanied with a very strange attendant, besides these moons, which is a material substance surrounding the planet near its equator, and is commonly called "Saturn's Ring." At the time when the solar system was enlightened, which was before the heavenly bodies were formed into globular shapes, the planet Saturn was rapidly formed by huge masses of different forms and sizes, which proceeded from all parts towards the planet, according to the principles which I have laid down in this work; and as these masses approached the planet on all sides, they approached also nearer to each other till they were very thick all around the planet, till at last they met, and joined together in one continued ring, forming that phenomenon which I here write of; but as soon as the world was enlightened, and the power of repulsion from the planet took place and began to act in opposition to the attractive force, this ring could not approach nearer to the planet, but was forced to revolve round it with great speed, and unless the ring is out of the sphere of Saturn's air, the ring turns on its own axis in the same time as Saturn takes to perform her diurnal rotation.

The furthest or outermost planet we know of at present in our system is called the "Georgium Sidus," which is attended by six visible moons. It was lately discovered by Dr. Herschel, who observed that the attendants of this planet do revolve about him from east to west, contrary to every other motion we know of in the heavenly system, but we have great reason to doubt the assertion of this great man on this point, not only because of its strangeness, nor because it contradicts the universal principle which I have in this work established, but also for the great distances of these orbs from our earthly globe, which render this problem probably insurmountable by any human observations.

THE END.

Printed by John Thomas, Priory Street, Carmarthen.

ERRATA.

Page 22, third line from top, for "fire" read "size."

Page 24, sixteenth line from top, for "also" read "yet."